A PROGRAM FOR IMPROVING MANAGEMENT AND RESEARCH OF FISHERIES IN THE WESTWARD REGION

PROJECT BLUE BOOK – FY 2013

Regional Information Report 4K11-13

Alaska Department of Fish and Game
Division of Commercial Fisheries
Westward Region

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INTRODUCTION

Alaska's constitution mandates the management of fish and wildlife resources according to sustained yield principles and for the maximum benefit of the public. In order to fulfill this responsibility the Alaska Department of Fish and Game (ADF&G) operates a wide variety of research and management programs for both fish and wildlife. The Division of Commercial Fisheries is divided administratively into four regions. The Westward Region (Region IV) covers roughly the quarter of the state situated from the Kodiak Archipelago westward along the southern coast of the Alaska Peninsula, out the length of the Aleutian Islands, back eastward up the northern coast of the Alaska Peninsula and, for shellfish and groundfish management, the waters of the Bering Sea and Bristol Bay. Effective management of these resources requires a broad understanding of the biological and physical characteristics of the environment these species depend on. A wide variety of research and management projects are conducted throughout the region, and throughout the year, to gather this information.

The Division of Commercial Fisheries, Westward Region publishes a list of fishery management and research funding priorities called the Project Blue Book. The blue book describes projects considered important to improve management and research of fisheries in the Westward Region that are not currently conducted due to lack of funding, or that are funded through revenues generated by test fish program receipts or outside agencies, but are at risk of losing funding. This document is published every three years and is updated by addendum annually. It is provided as requested to stakeholders, other interested public, and state representatives in the legislature. The blue book serves as the primary reference document for regional and division staff when developing detailed funding proposals and includes proposed projects for: 1) salmon and herring, and 2) shellfish and groundfish.

Proposed Westward Region projects are listed in Table 1 in descending order of priority. These include proposed management and research projects associated with all of the salmon, herring, shellfish and groundfish fisheries that occur within the region. Following the overall summary of project priorities is an overview and management description of the region's salmon and herring fisheries and detailed descriptions of proposed salmon and herring projects. The blue book concludes with descriptions of the shellfish and groundfish fisheries within the region and proposed projects for improving management and research of these fisheries.

WESTWARD REGION PROPOSED PROJECTS FOR FY 2013

Table 1.–Proposed FY 13 Westward Region fisheries projects and estimated cost (thousands of dollars), listed in descending order of priority.

Regional rank	Project	Year of first appearance in blue book	Estimated first-year cost ($)	Estimated annual cost ($)	Duration
1	Bering Sea-Aleutian Islands Crab Research and Observer Personnel	2003	1,185	1,185	Ongoing
2	Kodiak, Chignik, South Alaska Peninsula Shellfish/Groundfish Management	2012	103	103	Ongoing
3	Maintain Current Levels for the Operation of Peninsula Weirs	2012	25	25	Ongoing
4	Chignik Sockeye Salmon Smolt Enumeration	Pre-2008	80	0	Ongoing
5	McLees Lake Weir	2012	75	35	Ongoing
6	Frazer Lake Fish Pass Diversion Weir	2011	200	0	1 year
7	Westward Region Sonar	Pre-2008	167	52	Ongoing
8	Chignik Sockeye Salmon Genetic Sampling	2012	30	30	Ongoing
9	Laboratory Upgrades to Expand Sockeye Salmon Rearing Habitat Assessments	2011	80	4	Ongoing
10	Kodiak and Afognak Islands Fish Pass Maintenance	Pre-2008	30	25	Ongoing
11	Additional Aerial Surveys	2011	15	15	Ongoing
12	Kodiak Research Project Biologists	Pre-2008	250	250	Ongoing
13	Bear River Weir Extension	Pre-2008	30	30	Ongoing
14	Golden King Crab Pot Mortality	2008	100	100	3 years
15	Chignik River Sonar	Pre-2008	49	49	Ongoing
16	Extended Operation of Existing Weirs	Pre-2008	100	100	Ongoing
17	Pasagshak Weir Replacement and Continuation	2012	125	75	Ongoing
18	Kodiak Area Dungeness Research	2003	40	40	3 years
19	Karluk Lagoon Sonar Testing	2009	24	0	1 year

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Regional rank	Project	Year of first appearance in blue book	Estimated first-year cost ($)	Estimated annual cost ($)	Duration
20	Alaska Peninsula Limnology	Pre-2008	109	109	Ongoing
21	Chignik Weir Extension	Pre-2008	75	75	Ongoing
22	Additional Salmon Weirs	Pre-2008	400	275	Ongoing
23	Olga Narrows Sonar	Pre-2008	125	50	Ongoing
24	Alitak Run Reconstruction	2012	12	12	Ongoing
25	Kodiak Herring Hydroacoustics	Pre-2008	57	57	Ongoing
26	Chignik Lagoon Test Fishery	Pre-2008	62	62	Ongoing

SALMON AND HERRING

OVERVIEW OF WESTWARD REGION SALMON AND HERRING FISHERIES

The Westward Region is composed of the Kodiak Island archipelago, the north and south sides of the Alaska Peninsula (including Chignik, the Shumagin Islands, and Port Moller), and the Aleutian Islands. Important salmon and herring fisheries occur throughout the coastal waters of the region. These fisheries are divided into four management areas, described below. The regional ADF&G office is in the City of Kodiak; other offices are in Chignik, Sand Point, Cold Bay, Dutch Harbor, and Port Moller.

Salmon and herring work by ADF&G in the Westward Region consists chiefly of monitoring fish populations and the environmental conditions that affect them, adaptively managing the region's fisheries (both inseason and postseason), identifying population abundances needed to provide sustainable future populations and harvestable surplus, and forecasting future population abundances. Salmon and herring work throughout the region is shared among two biologist sections, management and research, that work together to convert monitoring data into management decisions and to identify ongoing regional monitoring and information needs. Fishery management and some of the population monitoring is conducted by biologists within the management section; identifying sustainable population abundance, forecasting future abundances, and monitoring some populations is conducted by biologists within the research section. This book lists both research and management projects resulting from ongoing discussions of regional priorities, and are based on a combination of the current state of knowledge, importance to the population or fishery, and future funding status.

Kodiak Management Area

The Kodiak Management Area (KMA) is composed of western Gulf of Alaska waters surrounding the entire Kodiak Island archipelago, along with Alaska Peninsula waters draining into the Shelikof Strait from Cape Douglas to Kilokak Rocks. The Kodiak archipelago and Alaska Peninsula portions of the KMA are each about 241 km in length, and separated by the 48-km wide Shelikof Strait.

The marine waters around the Kodiak Island archipelago are among the most productive in the North Pacific. Offshore upwelling combines with abundant freshwater runoff to make nearshore waters rich in nutrients. Approximately 800 anadromous salmon streams are located throughout the KMA. These systems combined support five salmon species: Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, pink *O. gorbuscha*, chum *O. keta* and coho *O. kisutch* salmon. About 39 of these systems support sockeye salmon runs. Unlike other areas in the state where one or two major systems are managed for relatively short fishing periods, there are many major and minor producing salmon systems throughout the KMA that require management throughout a five-month fishing season. Biologists manage for 25 salmon escapement goals in the KMA, monitoring the populations with weirs and aerial surveys.

Natural production of wild salmon in the region is supplemented by two hatcheries, both operated by Kodiak Regional Aquaculture Association (KRAA). The Kitoi Bay Hatchery primarily produces pink salmon for harvest in a common property fishery as the fish return to the hatchery. The Pillar Creek Hatchery is primarily an incubation facility for sockeye salmon that are stocked as fry in various systems throughout the KMA. Biologists for the Westward Region

work with KRAA to issue permits, assess the strength of returning hatchery runs, and determine fry stocking levels supportable by current habitat conditions.

Pacific herring, *Clupea pallasii*, can generally be found seasonally in all bays of the KMA. The department currently monitors 70 sections with known spawning populations of herring. Kodiak is unique in that there are several distinct spawning populations of herring throughout the archipelago, unlike many other areas with one large biomass. Surveying the various distinct stocks of herring is a crucial part of evaluating herring biomass which is vital when establishing the multiple guideline harvest levels. The extent of the herring fishery is directly tied to the amount of surveys that can be conducted to set guideline harvest limits.

Chignik Management Area

The Chignik Management Area (CMA) lies to the west of the KMA, on the south side of the Alaska Peninsula, and includes all coastal waters and inland drainages of the northwest Gulf of Alaska between Kilokak Rocks and Kupreanof Point. The CMA includes approximately 109 salmon producing streams, and has 100 purse seine permit holders who can fish the CMA for all five Pacific salmon species. Commercial and subsistence salmon are the economic mainstay for the four main communities of Chignik Lake, Chignik Lagoon, Chignik Bay, and Perryville.

The Chignik River system is the major sockeye salmon producer within the area; the sockeye salmon run consists of both an early and a late run, which are genetically distinct populations that spawn in different locations but have substantial overlap in run timing at the river mouth. The Chignik River is also the major Chinook salmon producer in the CMA. Chum, pink, and coho salmon occur throughout the CMA. Biologists manage for six salmon escapement goals in the CMA, monitoring the populations with weirs and aerial surveys. There are no hatchery-produced salmon in the CMA, and no ongoing herring fisheries.

Alaska Peninsula, Aleutian Islands, and Atka-Amlia Management Areas

The Alaska Peninsula Salmon Management Area lies to the west of the CMA, and then extends northeasterly along the north side of the Alaska Peninsula. Altogether, the area includes waters of the South Peninsula from Kupreanof Point west to Scotch Cap and waters of the North Peninsula from Cape Menshikof west to Cape Sarichef. The Aleutian Islands Management Area consists of the Bering Sea and Pacific Ocean waters of the Aleutian Islands west of Unimak Island to the 1990 Maritime Boundary Agreement Line between the U.S. and the former U.S.S.R., including waters surrounding the Pribilof Islands. The Atka-Amlia Management Area consists of Bering Sea and Pacific Ocean waters extending west of Seguam Pass and east of Atka Pass. The Alaska Peninsula and Aleutian Islands Salmon Management Areas are collectively referred to as Area M, while the Atka-Amlia Salmon Management Area is referred to as Area F. Fisheries drive the local economies throughout the region.

All five species of Pacific salmon are found in this area. Pink, chum, and coho salmon spawn throughout; sockeye and Chinook salmon spawn mainly on the north and south sides of the Alaska Peninsula and on Unalaska Island (sockeye salmon only). Biologists manage for 26 salmon escapement goals, monitoring the populations with weirs and aerial surveys. There is no hatchery supplementation of salmon. A herring fishery is conducted near Unalaska Island.

MANAGEMENT OF WESTWARD REGION SALMON AND HERRING FISHERIES

Region IV salmon and herring fisheries encompass four separate management areas, Area K, Area L, Area M and Area F, and are managed by four Area Management Biologists. The commercial salmon fisheries that take place in Area M and Area L are managed through four field offices located in Sand Point, Cold Bay, Port Moller, and Chignik. During a portion of the season, salmon that are caught in areas K and M fishery are considered to be migrating to other areas.

Directed commercial fisheries occur on sockeye, pink, chum, and coho salmon. There are no directed commercial fisheries for Chinook salmon. Commercial salmon fisheries may be allowed if salmon runs appear to be surplus to escapement needs. Inseason management activities focus on qualitative analysis of run timing, catch per unit effort (CPUE), species composition of the catch, regulatory management plans, aerial survey estimates and weir escapement counts. The Alaska Board of Fisheries (BOF) has approved 15 regulatory management plans that establish harvest strategies intended to maintain the biological integrity of local salmon stocks and address the allocative concerns of local fishermen. In addition to direct management activities, regional staff conducts research, and rehabilitation and enhancement studies.

Commercial herring fisheries include both sac roe and food/bait fisheries. The majority of Region IV herring are harvested in the KMA sac roe and Dutch Harbor food/bait fisheries. Herring are intermittently harvested in the Northern District of Area M and are usually harvested by fishermen traveling from the herring grounds in Togiak. The allowable harvest of herring is based on a sliding scale which provides a percentage of the biomass based on the observed tonnage around Port Moller. Herring have been historically harvested in the South Peninsula management area however no harvests have occurred in recent years.

The Alaska BOF has developed commercial herring harvest strategies that require the department to establish guideline harvest levels (GHLs) by section, based on historical harvest data, current and past fishery performance, commercial catch samples, and aerial biomass surveys.

Further knowledge of the population and habitat dynamics of local salmon and herring stocks as well as stock composition estimates of commercial harvests would greatly aid the department in harvesting local and migratory finfish stocks at appropriate levels.

PROPOSED PROJECTS

Twenty-two projects were identified as important to the region, and are listed in descending order of priority in Table 2. Conceptually, these projects fall into one of four main categories: replacement of lost funds on existing projects, replacement of aging infrastructure, expansion or inception of projects needed to assess and manage fisheries, and personnel funds. Projects with lost funds and/or aging infrastructure are generally the most urgent, accounting for six of the eight highest priorities; without new funds, the department's ability to assess or manage the corresponding fisheries will soon be reduced from present levels. The remaining projects identify opportunities for the department to increase or improve the assessment and management of existing fisheries, thereby improving opportunities for the commercial fishery.

Five of the projects are new requests as of FY13, including two of the top three (#1 Peninsula weir maintenance; #3 McLees Lake weir maintenance). Conversely, 13 of the 22 projects have

been requested since at least 2008; one of these, #2 Chignik smolt monitoring, is now the second highest priority on the list due to projected loss of grant funding in 2013. ADF&G has actively sought funding from other sources for most of the projects remaining from 2008, with several projects receiving partial funding (e.g., #5 Westward Region sonar).

SALMON AND HERRING PROJECT LIST AND DESCRIPTION

Table 2.–Proposed FY13 Westward Region salmon and herring fisheries projects and estimated cost (thousands of dollars), listed in descending order of priority.

Priority	Project	Year of first appearance in Blue Book	Estimated first-year cost ($)	Estimated annual cost ($)	Duration
1	Maintain Current Levels for the Operation of Peninsula Weirs	2012	25	25	Ongoing
2	Chignik Sockeye Salmon Smolt Enumeration	Pre-2008	80	80	Ongoing
3	McLees Lake Weir	2012	75	35	Ongoing
4	Frazer Lake Fish Pass Diversion Weir	2011	200	0	1 year
5	Westward Region Sonar	Pre-2008	167	52	Ongoing
6	Chignik Sockeye Salmon Genetic Sampling	2012	30	30	Ongoing
7	Laboratory Upgrades to Expand Sockeye Salmon Rearing Habitat Assessments	2011	80	4	Ongoing
8	Kodiak and Afognak Islands Fish Pass Maintenance	Pre-2008	30	25	Ongoing
9	Additional Aerial Surveys	2011	15	15	Ongoing
10	Kodiak Research Project Biologists	Pre-2008	250	250	Ongoing
11	Bear River Weir Extension	Pre-2008	30	30	Ongoing
12	Chignik River Sonar	Pre-2008	49	49	Ongoing
13	Extended Operation of Existing Weirs	Pre-2008	100	100	Ongoing
14	Pasagshak Weir Replacement and Continuation	2012	125	75	Ongoing
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1. **Maintain Current Levels for the Operation of North Peninsula Weirs**

Location: Northern District of Area M.

Primary Objective: To maintain the current operation of weirs located in the Northern District of Area M, including the Ilnik, Sandy, Bear and Nelson rivers to enumerate sockeye salmon escapements and maintain historical fisheries practices.

Description: The North Peninsula weirs include Nelson, Sandy, Bear, and Ilnik rivers and are located on the North Alaska Peninsula.

On average sockeye salmon escape into these systems range from late May through September. Due to increased personnel costs and increased operating costs the department has decreased the amount of time the weirs are in place and recently there has been the potential to cut a weir. The operation of these weirs is used for daily inseason management for the Northern District sockeye salmon fisheries. Without daily escapement information, the department would not be able to manage the fishery in a timely fashion and lost harvest opportunity or overharvest will likely occur. This funding would maintain the current operation of the North Peninsula weirs and ensure accurate sockeye salmon counts as well as maintain brood tables for forecasting purposes.

Bear River supports the largest sockeye salmon fishery on the North Peninsula, has a combined early- and late-run escapement goal of 293,000–488,000 sockeye salmon, and provides fishing opportunities for about 100 permit holders. The Nelson River weir allows the department to manage the terminal sockeye salmon commercial fishery that occurs in Nelson Lagoon used primarily by local residents of the village of Nelson Lagoon. There are between 35 and 40 drift and set gillnet permit holders that fish for Chinook, sockeye, chum, and coho salmon in Nelson Lagoon. There is also a Biological Escapement Goal (BEG) for the Nelson River Chinook salmon run (2,400–4,400 fish), and the divisions of Sport and Commercial Fisheries take management actions to control the harvest in order to meet the goal. Both the Sandy and Ilnik rivers contribute a substantial portion of the North Peninsula salmon harvest.

Duration: Ongoing

Estimated Annual Cost: $25.0

2. **Chignik Sockeye Salmon Smolt Abundance and Limnology Sampling**

Location: Chignik River, Chignik Management Area.

Primary Objective: (1) Estimate the abundance, age composition, and size of sockeye salmon smolt emigrating from the Chignik River Basin, (2) Generate smolt data used to help forecast adult returns and to assess changes in population trends, and (3) Collect limnology data to assess environmental trends and linkages with juvenile salmon production.

Description: The Chignik River watershed supports two temporally stratified (but overlapping) sockeye salmon runs important for both commercial and subsistence harvests. A sockeye salmon smolt project was fully funded by grants from 1994 through 2011, and approved for 2012. New funds will be needed for continuation of the smolt project in 2013.

This project estimates the annual abundance of Chignik River sockeye salmon smolt, characterizes their size and age, collects environmental data, and forecasts adult returns. Juvenile salmon data can improve forecast accuracy (relative to spawner-return models) by determining

the abundance and condition of juveniles after the significant mortality occurring between adult escapement and the progeny's outmigration to the sea. Additionally, this project collects water quality data (including phytoplankton, zooplankton, nutrient data and water chemistry composition) throughout the basin and conducts community outreach in Chignik Lake village. Because the larger sampling equipment is already purchased and on site, funds only need to cover the salaries, sampling supplies, and travel.

Reliable funding would ensure that this valuable smolt dataset continues to grow and become more useful for assessing trends over time and linkages between salmon and the environment. The limnology and fisheries data collected from previous years of this project are becoming increasingly important as more information is gathered relative to adult returns and changing climate. For example, it was only after 2010 that the smolt abundance dataset became lengthy enough to use for adult run forecasting; similarly, long time series of data increase the ability to evaluate limnological and environmental factors that affect sockeye salmon survival.

Duration: Ongoing.

Estimated Annual Cost: $80.0

3. **McLees Lake Weir**

Location: McLees Lake, Unalaska.

Primary Objective: Estimation of sockeye salmon escapement into McLees Lake, Unalaska.

Description: Funding to estimate sockeye salmon escapements into McLees Lake has been provided by the Subsistence Fisheries Monitoring Program since 2001, to assess the most significant salmon stock that supports subsistence fishing effort by federally qualified subsistence fishers in Dutch Harbor. This project was originally envisioned to provide only several years of accurate escapement data, essentially a 'snapshot' to serve as a basis for comparison for any future assessments.

Escapements have varied by an order of magnitude, and appear to have steadily declined since 2003. In response to the low returns during 2008–2009, the subsistence fishery was closed in-season by ADF&G. Continuation of escapement monitoring is essential to avoid excessive exploitation, and an escapement goal was implemented in 2010 to help ensure sustainable escapements. Escapements have improved however local stake holders are concerned about declining runs and wish to protect this important resource.

This project has been identified in the past as a priority information need by the Kodiak Aleutians Regional Advisory Council and the Fisheries Monitoring Program. Results from this project will help to ensure that future subsistence harvest opportunities are available and that fishery harvests will have no negative impact on the long-term health of the sockeye salmon run at McLees Lake.

Duration: Ongoing.

Estimated Annual Cost: $75 startup costs ($35 annually)

4. **Frazer Fish Pass Diversion Weir**

Location: Kodiak.

Primary Objective: Provide essential improvements to the infrastructure needed to sustain the sockeye salmon run at Frazer Lake.

Description: Sockeye salmon returning to Frazer Lake are managed for a biological escapement goal of 75,000–170,000 fish annually. Salmon cannot navigate a waterfall located downstream of Frazer Lake, and must instead ascend a fish pass built and maintained by ADF&G. The fish pass structure consists of a diversion weir across the river (constructed in 1971 and 1972) that shunts fish towards an entrance chute to the fish pass, the fish pass itself (an aluminum raceway built in 1962), and a holding tank at the top of the fish pass that allows biologists to count and sample the fish. Escapement to Frazer Lake is thus dependent not only on fish ascending the pass, but also on fish being able to find the entrance chute and gain access to the bottom of the pass. Approximately 40,000 sockeye salmon each year enter the river but fail to ascend the fish pass; it is suspected that most of these either fail to locate the fish pass entrance, are eaten by bears as they search for the entrance, or are physically unable to ascend the pass.

To maintain the run of salmon, the Frazer fish pass structure requires low-level, ongoing maintenance punctuated by major renovations every couple of decades. The diversion weir was first installed in 1972, then partially renovated in 2003. Further renovations were needed, but impossible because of insufficient funds. At the time, staff estimated the useful life of the weir to be through 2013; by then, the weir would need a significant superstructure rebuild in response to bank erosion, stress fractures, corrosion and rot. This request would address the maintenance needs identified in 2003.

Duration: One year.

Estimated Annual Cost: $200.0

5. **Westward Region Sonar**

Location: Westward Region.

Primary Objective: Estimate salmon abundance to help manage Westward Region commercial salmon fisheries.

Description: This request would fund the operating cost of a sonar unit recently purchased for the Kodiak Management Area, along with the purchase and operating costs for a second full unit. The sonar units would be used to help commercial salmon fishery management and research within Westward Region. The sonar would be used to provide timely inseason escapement estimates, allow fish counts during emergencies when weirs are flooded or inoperable, and to address applied research questions such as smolt avoidance of traps and salmon movement and distribution at counting sites. At some sites, a sonar unit may be the only feasible way to count adult salmon.

Region IV recently received funding for one unit that uses technology known as Dual-Frequency Identification Sonar (DIDSON). Operating funds for this sonar, however, were not provided. The current request would provide staff time for this existing DIDSON, along with staff and capital

costs needed for a second sonar unit. We have scoped this second unit as a DIDSON, but may substitute other sonar of similar cost depending on technology development in the interim.

Sonar units would be deployed in places where they would help ADF&G reach salmon escapement goals, help prevent foregone harvest, or both. Examples applications in the Westward Region:

- Used as backup for weirs, deployed when water conditions would cause gaps in weir coverage and cause fish to move upstream uncounted;
- Used at sites, or times, with no current assessment projects;
- Used to shorten the lead time between passage through a fishery and escapement into a river.

Such uses will help managers reduce the inherent risk between overharvesting a run that can affect future returns, or allowing overescapement that causes foregone harvest while having potentially negative biological effects.

Duration: Ongoing.

Estimated Annual Cost: $167.0 in year 1, $52.0 ongoing. Year 1 cost comprises $115.0 for one new unit, and $26.0 operating costs for each of two systems.

6. **Chignik Inseason Sockeye Salmon Genetic Assessment**

Location: Chignik River, Chignik Management Area.

Primary Objective: Determine the inseason stock of origin of sockeye salmon in the Chignik River.

Description: Virtually all sockeye salmon harvested in the Chignik Lagoon are destined for the Chignik watershed. There are two stocks in the watershed, referred to as the early and late run, which are genetically distinct and spatially separated but overlap in run timing. The early run spawns in Black Lake and its tributaries, whereas the late run spawns in Chignik Lake and its tributaries. The overlap in run timing makes it difficult to manage the fishery in a way that provides sufficient escapement of each stock while maximizing harvest.

From 1980 through 2003, scale pattern analysis was used to differentiate the two stocks in season to aid in management of the fishery. Funding cuts eliminated this project in 2004; since then, July 4 has been used as a fixed cutoff date to separate the runs. Such a fixed date almost certainly causes some error in assignment of fish to the correct run; in years where run timing is unusual, this error rate would grow and thus risk a large foregone harvest or a failure to maintain each run within the recommended escapement goal range. Further, accurate stock separation information would improve estimates of marine survival, increase forecasting accuracy, and identify productivity differences between the two runs.

Recent advancements in genetic techniques have made inseason analysis of Chignik Lagoon sockeye salmon harvests possible. These techniques have been developed and proofed with grant funds from 2010 through 2012; beginning in 2013, an alternate funding source will be needed to continue the project and use this technique as a management tool.

Duration: Ongoing.

Estimated Annual Cost: $30.0 (estimated first-year cost: $30.0)

7. **Laboratory Upgrades to Expand Sockeye Salmon Rearing Habitat Assessments**

Location: Kodiak.

Primary Objective: Increase the quantity and improve the accuracy and resolution of nutrient data collected from lakes throughout the Westward Region.

Description: Recent declines in Chinook and sockeye salmon returning to some Alaska Peninsula and Kodiak Island systems have negatively affected multiple user groups. The causes of fluctuating salmon returns are difficult to understand, often because the quality and resolution of available data is insufficient to identify where resource bottlenecks occur. Nutrients such as nitrogen and phosphorous are known to drive the forage base in some salmonid nursery lakes and can greatly affect juvenile salmonid survival, thus affecting adult returns. Current limnological investigations in Alaska Peninsula and Kodiak Island lakes, however, are limited in scope and resolution because current water sampling equipment is not automated and thus limits both speed and volume. This project would fund the initial acquisition and annual maintenance costs of a 5-channel autoanalyzer to process water samples for nutrient concentrations; the instrument would allow an approximately seven-fold increase in the amount of water samples that can be processed. The increased processing capacity would expand sample collections, while freeing staff time to conduct more advanced data analyses in place of sample processing. The richer datasets will increase the detail of current analyses and may be the only way large new projects can be supported at the local level.

Duration: Ongoing.

Estimated Annual Cost: $80.0 in year 1, $4.0 ongoing.

8. **Kodiak and Afognak Islands Fish Pass Maintenance**

Location: Frazer Lake, Pauls Lake watershed, Portage River, Little Waterfall Creek, Seal Bay Creek; Kodiak and Afognak Islands.

Primary Objective: Provide ongoing maintenance for fish passage needed to maintain historic levels of salmon returns in select systems.

Description: Frazer Lake, Pauls Lake watershed, Portage River, Little Waterfall Creek, and Seal Bay Creek fish passes were installed and made operational in the 1960s and 1970s. These fish passes have been instrumental in developing sustained salmon runs at each system by allowing salmon passage to upstream spawning habitat, and are essential for maintaining future salmon production. Commercial harvests of fish returning to these systems average over 350,000 sockeye salmon and a substantial number of pink and coho salmon each year. The fish passes are located on dynamic systems that often experience high water flows and heavy debris loads. Currently, ADF&G has no funds dedicated specifically to the routine maintenance of these structures; instead, such maintenance usually comes from funds leftover from an associated fish monitoring project or from the entire region at the end of the fiscal year. As a result, many of the structures have fallen into disrepair.

This project would reinstate an annual maintenance program on eight fish passes and associated resting pools, diversion weirs, and water diversion structures. Fish passes and associated structures would be inventoried and evaluated for annual maintenance needs. Maintenance work would be completed once the required equipment, supplies and other needs are acquired. Safety

features would be added to structure in high-traffic areas (such as Frazer Lake). Typical maintenance work would include removing unwanted debris and gravel that accumulates routinely, replacing fish pass covers, installing and repairing water diversion structures, and replacing structural items like gabion supports, cross braces, and support cables.

Duration: Ongoing.

Estimated Annual Cost: $30.0 in year 1, $25.0 ongoing.

9. **Additional Aerial Survey Flights**

Location: Kodiak Management Area (KMA).

Primary Objective: Sustain current aerial survey flights for salmon.

Description: Increasing fuel costs have steadily increased the charter costs for aerial surveys however funding has not kept pace with the increase costs. Aerial surveys in the KMA are essential for the management of pink, chum and coho salmon. The majority of large sockeye salmon systems have weirs in place however more than 90% of the pink and chum salmon counts are accomplished using aerial survey counts. Reducing the number of aerial surveys would reduce the harvest opportunity of pink and chum salmon. Pink salmon contribute the majority of the harvest in the KMA with a previous ten-year average (2001–2010) of over 20 million pink salmon.

Duration: ongoing.

Estimated Annual Cost: $15.0

10. **Kodiak Research Project Biologists**

Location: Westward Region; Kodiak Island, Chignik, Alaska Peninsula/Aleutian Islands.

Primary Objective: To fully staff the Westward Region Finfish Research Program.

Description: Permanent fulltime (PFT) Fishery Biologist (FB) positions within the Westward Region Finfish Research Program have declined from three PFT FB IIIs, and three PFT FB IIs in 2002, to two PFT FB IIIs and two PFT FB IIs in 2008 as a result of budget reductions. Program responsibilities have remained relatively unchanged. To compensate for the reductions in PFT FB III and II positions, shorter-term permanent seasonal (PS) FB I positions have been upgraded to longer-term PS FB II positions and maintained almost entirely through soft money grant funds. This has resulted in a loss of the FB I positions, limiting the technical expertise available to field projects and eroding the ability to train entry level biologists to move into the PF FB II positions. More importantly, many duties have been consolidated, causing excessive workloads that prevent some high-priority topics from receiving sufficient attention. For example, the elimination of one PFT FB III position resulted in another PFT FB III absorbing essentially all of the responsibilities and duties of the former position. Many important tasks do not get accomplished and others are delegated to inexperienced staff. One of the most important stocks in the region, Frazer Lake sockeye salmon, has had no report published in recent years because of the lack of staff availability.

The loss of technical expertise in the field, the limitations on training, and the burden on key program managers (PFT FB II and IIIs) has directly impacted the Finfish Research Program's ability to focus on key areas of research that would assist with management of the region's commercial fisheries. In some cases, the lack of scientifically sound information for some stocks has resulted in conservative fishery management, which in turn has reduced the harvests and economic opportunity for the commercial fishing fleet.

This project would restore PFT and PS FB positions within the Westward Region Finfish Research Program to the stable and appropriate levels experienced in 2002. Funds are requested for salaries for one PFT FB III, one PFT FB II, and two PS FB Is. These funds would provide the appropriate personnel to conduct the various stock assessment tasks, including collecting biological data important to understanding the productivity, life history, and other parameters necessary to manage the finfish resources within the Westward Region of the Division of Commercial Fisheries. The funds can also be used to provide a match for new grants, further leveraging their value for projects within the Westward Region.

Duration: Ongoing.

Estimated Annual Cost: $250.0

11. **Bear River Weir Extension**

Location: Bear River, North Alaska Peninsula.

Primary Objective: To extend the operation of the Bear River salmon counting weir from August 25 to September 10 to allow for better estimates of sockeye and coho salmon escapements. This would improve management accuracy and ability to forecast future production.

Description: The Bear River weir is located 10 miles northeast of Port Moller on the North Alaska Peninsula. The weir has been used for daily inseason management since 1987 for the Bear River, Three Hills, and Ilnik sections sockeye salmon fisheries. Bear River supports the largest sockeye salmon fishery on the North Peninsula, has a combined early- and late-run escapement goal of 293,000–488,000 sockeye salmon, and provides fishing opportunities for about 100 permit holders.

On average sockeye salmon escape into this system from late May through September. Due to budget constraints ADF&G must remove the weir on or about August 25 and then estimate the post-weir run, which has been as high as 90,000 sockeye salmon. General Fund reductions due to increased operating and personnel costs have limited the department's ability to keep the Bear River weir in operation. This funding would pay for an additional two weeks of operational time for the weir after August 25, and ensure that complete, accurate sockeye salmon counts are made, and that brood tables can be constructed for forecasting. In addition, coho salmon, which are not currently counted through the weir, would be enumerated providing the department with run timing and strength of the coho salmon run into Bear Lake.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: $30.0 (estimated first-year cost: $30.0)

12. **Chignik River Sonar**

Location: Chignik River; Chignik Management Area.

Primary Objectives: (1) Estimate the abundance of sockeye and coho salmon returning to the Chignik watershed in September each year; (2) Provide a backup to counts at the Chignik weir (operated from June through August) when the weir becomes inoperable due to high water.

Description: Sonar is the only technology besides a weir that is feasible for counting sockeye salmon in the Chignik River. The department has been awarded a grant to test and operate a DIDSON sonar unit in the Chignik River from 2011 through 2013, both to provide a backup for ongoing weir counts and to provide the only counts in September (when the weir is removed each year). After 2013, operational funds will be needed to continue the sonar project; the larger capital startup costs were funded by the original grant.

Sonar counts allow biologists the first opportunity to characterize the size and shape of the sockeye and coho salmon runs in September. Sockeye salmon escapement in September has historically only been modeled based on weir counts through August, and coho salmon escapement has never been estimated. During the months of weir operation (June through August), the Chignik River weir has washed out on numerous occasions, often taking considerable time to reinstall. The sonar unit can now be deployed in such conditions, preventing loss of inseason data needed to precisely manage the commercial and subsistence fisheries and ensure a sufficient number of salmon is available for escapement and harvest.

Duration: Ongoing.

Estimated Annual Cost: $49.0

13. **Extended Operation of Existing Weirs**

Location: Karluk, Ayakulik, Dog Salmon, Upper Station, and Afognak (Litnik) rivers; Kodiak and Afognak Islands.

Primary Objective: To extend the operation of existing salmon counting weirs, thereby allowing better estimates of sockeye and coho salmon escapements into representative streams, leading to greater management precision to maximum harvest opportunity and increased ability to forecast future production. Description: Inconsistent run timing of sockeye salmon in some of the Kodiak's major sockeye salmon producing systems have forced managers to begin operation of salmon counting weirs earlier in the season or extend operation later in the season than in past years. In order to obtain accurate assessments of early-run sockeye salmon into the Karluk, Ayakulik, Dog Salmon, Upper Station, and Afognak (Litnik) rivers, the department has deployed the salmon counting weir crews earlier in the season. Unfortunately, the result of earlier weir placement is earlier removal for some weirs due to budget constraints. Removing weirs earlier reduces KMA manager's ability to monitor coho salmon runs (and in some cases, late sockeye salmon runs).

Coho salmon are an important part of the Kodiak area commercial fisheries, with catches averaging (2001–2010) 400 thousand fish annually. Some major, and a few representative minor, coho salmon streams have fish counting weirs but, due to the funding constraints, the weirs are removed prior to the coho salmon escapements. Escapement information is used to manage the commercial and sport fisheries, and to forecast future production. Coho salmon escape into area

streams from late August through October, mainly migrating upstream during the highest tide series in September and early October. Through the mid 1980s, Kodiak salmon weirs were kept in operation through late September or even late October. General Fund reductions and increased operating costs have limited the department's ability to keep weirs in place through the month of September, with most weirs being removed in August or early September. Salmon escapements may also be estimated by aerial surveys; however, late season surveys are difficult and dangerous due to inclement weather conditions. The department's inability to collect accurate escapement information leads to uncertainty, thus leading to more conservative management and increased probability of management errors. On occasion, fisheries have been closed due to a lack of knowledge about coho salmon escapement. This project would allow extended operations of five Kodiak weirs through late September, promoting complete and accurate assessment of coho salmon escapements.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: $100.0 (estimated first-year cost: $100.0)

14. **Replacement and Continuation of the Pasagshak River Weir**

Location: Pasagshak River, Kodiak Island.

Primary Objective: Collect accurate and timely sockeye salmon escapement data from the Pasagshak River system. These data are necessary for inseason management actions that help protect the stock.

Description: The Pasagshak River, located on the Kodiak road system, currently supports the one of the largest sockeye salmon subsistence fisheries for Kodiak Island residents. During the past decade, subsistence harvest of Pasagshak River sockeye salmon has steadily increased while escapement estimates have diminished, coincident with recent poor runs to Afognak and Buskin lake systems. Until 2011 aerial surveys were used to estimate the annual sockeye salmon escapement; however, that methodology does not provide estimates until after the fishing season is complete, making inseason management actions impossible.

In 2011, the Alaska Sustainable Salmon Fund provided three years of funding for a weir project at the Pasagshak River to enumerate sockeye salmon, using tripod weir materials temporarily borrowed. Although the borrowed materials are not a perfect fit for the site, the project has been successful and has garnered a large amount of local public support. Additional funding for a floating weir dedicated to the Pasagshak River exclusively would provide materials more suitable for the site and allow project continuation after the grant funds expire, thereby helping ensure the sustainability of this important stock.

Duration: Ongoing.

Estimated Annual Cost: $125.0 in year 1, $75.0 thereafter.

15. **Karluk Lagoon Sonar Testing**

Location: Karluk Lagoon, Westside Kodiak; Kodiak Island.

Primary Objective: Assess the feasibility of using sonar in the Karluk Lagoon to count salmon entering the Karluk River.

Description: Karluk Lake is located on the western part of Kodiak Island and supports one of the largest runs of both sockeye and Chinook salmon in the Kodiak Management Area.

The primary problem with the management Karluk area sockeye salmon is that salmon abundance is not known until salmon have passed a counting weir three miles upstream from the ocean. Prior to this, fish may enter the river system and hold for 1–2 weeks, especially in the lagoon. In years of high abundance, this behavior risks overescapement because managers are unaware of how large the run is until the fish reach the weir, after which they cannot increase the commercial fishery to offset the unexpected escapement. Precise fishery management is thus unusually difficult and has resulted in sockeye salmon overescapement and foregone harvest in most years of high abundance. This problem has not been solved yet because Karluk Lagoon contains deep, dark holding areas especially poor for counting salmon. Sonar offers a potential solution, and has been tested briefly at the site; it appears promising, but would need more dedicated effort to assess the feasibility before committing to a new method.

Duration: One year.

Estimated Annual Cost: $24.0

16. **Alaska Peninsula Limnology**

Location: Alaska Peninsula.

Primary Objective: (1) Document, describe, and model available forage bases to assess carrying capacity for rearing sockeye salmon; (2) Assess how this capacity covaries with climate change on the Alaska Peninsula.

Description: Limnology data have been collected from three sockeye salmon nursery lakes (Black, Chignik and Bear lakes) on the Alaska Peninsula since 2000. Limnology data help salmon fisheries management by helping determine escapement goal levels, improving forecasting accuracy, providing information for fisheries management recommendations, and identifying conditions affecting rearing strategies and survival of juvenile salmonids. These data have become increasingly valuable because they also document the effects of regional climate change on local environments and indicate how climate changes may affect the salmon fisheries. The length of the dataset (number of years) on these three lakes provides additional benefit because the explanatory power of such data grows as the length increases.

Limnology data include basic water chemistry, zooplankton abundance and biomass, and nutrient levels. Basic water chemistry can indicate when freshwater conditions change relative to climate or geological events. Zooplankton data can identify forage limitations caused by overgrazing by juvenile sockeye salmon or by insufficient phytoplankton (the food of zooplankton) production. Nutrient data can indicate if conditions are favorable (all sockeye lakes should have suitable conditions) for phytoplankton production.

At present, no funding is available to continue limnology sampling on the Alaska Peninsula. Funding for this project would provide for collection (May through August), analysis, and reporting of limnology data from the Black, Chignik, Bear, Orzinski, and Sandy lakes. The data collected would assist biologists in examining factors that may be limiting juvenile sockeye salmon rearing capacity, and assessing current escapement goals and salmon run forecasts. Funding for this project would also maintain the continuity of established Westward Region data

sets that have suffered from General Fund budget reductions or recently lost non-state funding, and help to evaluate systems that have not been examined in over a decade.

Duration: Ongoing.

Estimated Annual Cost: $109.0

17. **Chignik Weir Extension**

Location: Chignik River, Chignik Management Area.

Primary Objective: To provide general fund revenue for the continued operation of the Chignik River salmon counting weir from August 4 through September 4 annually, allowing for better sockeye and coho salmon stock assessment necessary to manage late season fisheries.

Description: Prior to 1996 the Chignik River weir was removed in early August due to budget constraints. Since 1996 the weir has been operated annually until approximately September 4 as a result of grant funding provided by the criminal settlement of the Exxon Valdez Oil Spill (EVOS). This funding was not available after 2003. From 2004 to 2006, this project was funded by ADF&G program receipts. Currently, funding is through special projects, fines and forfeitures. A long-term funding source is being sought to extend the seasonal operation of the Chignik River weir.

Salmon escapement data collected at the Chignik weir during August and early September have been vital to the management of the late season subsistence and commercial Chignik salmon fisheries. Almost half of the salmon taken for subsistence in the communities within the CMA are harvested from the late run of sockeye salmon to the Chignik watershed, and the department is required to provide 50,000 sockeye salmon for subsistence purposes during August and September. Late-season escapement data have also been used to estimate continued salmon escapement into the Chignik River after the weir is removed. Long-term stable funding dedicated to the operation of the Chignik River weir from August 4 through September 4 would improve the department's ability to meet escapement requirements while maximizing subsistence and commercial harvest opportunities in the area.

Duration: Ongoing.

Estimated Annual Cost: $75.0

18. **Additional Salmon Weirs**

Location: Uganik River, Northwest Kodiak District; Akalura River, Alitak Bay District; Pauls Bay, Big Creek, Thorsheim Creek, Portage Creek, Afognak District; Kodiak, Afognak and Shuyak Islands.

Primary Objective: To collect accurate and timely sockeye salmon escapement data from the Uganik, Akalura, Pauls Bay, Big Creek, Thorsheim, and Portage systems. These data would improve management precision and result in increased harvest opportunities.

Description: The Uganik River is a major salmon system located on Kodiak Island's west side, capable of producing hundreds of thousands of sockeye salmon, hundreds of thousands of pink salmon, and tens of thousands of chum and coho salmon for commercial harvest. This river

system is situated in the middle of the major commercial fishing area used to manage the salmon return to westside Kodiak streams, targeted by seine and set gillnet fishers. The FWS and ADF&G conducted a weir feasibility study on this river from 1990 through 1992, documenting escapements much greater than observed previously or since via aerial surveys. Despite the success of the project and the provision of weir materials, the State failed to fund continued operations. Current Uganik River escapement estimates are made from aerial surveys, which are not sufficient to manage the commercial fishery while consistently achieving escapements. Sockeye salmon estimates are especially problematic to obtain because these fish move quickly through the river, and may hold for weeks in the deep water of the lake where they cannot be observed. Aerial enumeration normally occurs well after the run is completed. Observed escapement estimates have ranged from 3,500 to 89,000 sockeye salmon, but have averaged only 33,300 since 1993. With accurate and timely escapement information, commercial fisheries management could be improved to maximize the production from this system. This project would provide funding to construct and annually operate a salmon counting weir on the Uganik River. Funds are needed to purchase equipment and materials, construct the weir and operate the weir and camp annually. Personnel funds are also needed to staff a weir camp.

The Pauls, Big, Thorsheim, and Portage creeks are important sockeye, pink and coho salmon systems on the Afognak and Shuyak islands. Weirs have been used for escapement monitoring at these systems, but because of the continuing decline in the operating budget, all of these projects have been cut over the past 15 years. As the trend towards higher salmon prices and higher exvessel values continues, the smaller systems continue to be at risk of overharvest. These projects would provide funding to construct and annually operate salmon counting weirs on the Pauls, Big, Thorsheim, and Portage creeks. Funds are needed to purchase equipment and materials, and operate the weirs and camps annually. Personnel funds are also needed to staff weir camps.

Akalura Lake is one of five sockeye salmon systems in Olga Bay supporting commercial sockeye salmon fisheries in the Alitak Bay District. Weirs have been used for escapement monitoring at Akalura Lake, but their use has been inconsistent because of limited funds and because the system is small and production is relatively low compared to other Kodiak Island systems that are monitored with weirs. Through a cooperative effort with the FWS and ADF&G, a weir on the Akalura River was operated from 2000 through 2003. With accurate and timely escapement information, commercial fisheries management could be improved to maximize the production from this system. This project would provide funding to construct and annually operate a salmon counting weir on the Akalura River. Funds are needed to purchase equipment and materials, construct the weir and operate the weir and camp annually. Personnel funds are also needed to staff a weir camp.

Duration: Ongoing.

Estimated Annual Cost: Estimated first-year cost: $400.0 ($275.0 ongoing)

19. **Olga Narrows Sonar**

Location: Olga Narrows, Alitak District; Kodiak Island.

Primary Objective: Estimate the relative abundance of sockeye salmon moving through Olga Narrows, thereby assisting commercial salmon management in the Alitak District.

Description: The Alitak Bay District supports an important commercial salmon fishery that has grown dramatically since the establishment of Frazer Lake sockeye salmon in the 1950s. Mean annual harvests of sockeye salmon in the district have varied over the years, but increased from 110,000 fish in the 1970s to 470,000 fish in the 2000s. Olga Narrows is a narrow marine channel through which salmon bound for at least four different watersheds in the district must pass. Two of these systems, Frazer Lake and Upper Station, are major producers of sockeye salmon with biological escapement goals. From 1986 to 2006, a gillnet test fishery was operated at the mouth of Olga Narrows to gauge the abundance of migrating sockeye salmon three to six days in advance of escapement. Although the test fishery supplied reliable data used to help manage for escapements, it was discontinued due to lack of funding.

Hydroacoustic equipment deployed in the Olga Narrows would provide a reliable estimate of the movement and relative abundance of fish through Olga Narrows. This area represents an ideal setting for a sonar site because of its shallow depth (< 17 m), narrow width (< 200 meters). In 2001, Olga Narrows was evaluated for possible hydroacoustic sites. Bottom profiles at nine different transects across Olga Narrows confirmed several suitable locations for a sonar beam to capture the water column. Funds for this project would allow for the purchase and operation of hydroacoustic equipment (110 kHz transducer with 5° beam) and would provide opportunities to conduct research on the movement patterns of sockeye salmon.

Duration: Ongoing.

Estimated Annual Cost: $125.0 in year 1, $50.0 ongoing.

20. **Alitak Bay Sockeye Salmon Run Reconstruction**

Location: Alitak Bay, Kodiak Management Area.

Primary Objective: (1) Conduct scale pattern analysis on Alitak Bay sockeye salmon commercial salmon fishery samples to assign stock of origin, (2) Generate more accurate run reconstructions used to help forecast adult returns and to assess changes in population trends.

Description: Frazer Lake (Dog Salmon Creek) and South Olga Lakes (Upper Station River) are the two major sockeye salmon systems in Alitak Bay. Both of these systems drain into Olga Bay. Between 1951 and 1971, sockeye salmon were introduced into Frazer Lake, which was barren of Pacific salmon. In 1962, a fish pass was constructed at a previously impassable waterfall, allowing salmon to return to the lake to spawn. The resulting population greatly increased the number of sockeye salmon bound for Olga Bay and accessible for commercial harvest in the Alitak Bay District.

Frazer Lake and Upper Station sockeye salmon are concurrently harvested in the Alitak Bay district. From previous tagging studies it is known that 80% of the outside seine harvest and 95% of the inside gillnet harvest is bound for one of these two systems, yet assigning stock of origin is problematic.

This project would fund a scale pattern analysis program to assign stock of origin to the Alitak Bay District commercial sockeye salmon harvest, using freshwater scale characteristics to develop a discriminant function that classifies fish into one of two possible populations (Frazer Lake or Upper Station). The method was used successfully from the 1980s through 2004, with

classification accuracies averaging 80–90%. Despite success, the project was discontinued due to lack of funds. Reliable funds would reinstitute this valuable project.

Duration: Ongoing.

Estimated Annual Cost: $12.0

21. **Kodiak Herring Hydroacoustics**

Location: Kodiak Management Area.

Primary Objective: Estimate the pre-spawning abundance and distribution of herring throughout the Kodiak Management Area.

Description: In 2002, ADF&G research biologists in Kodiak began a collaborative project with Prince William Sound Science Center (PWSSC) to use hydroacoustics to assess the biomass of overwintering herring in Uganik Bay on Kodiak Island. As a result, Kodiak research staff acquired the training and hydroacoustic equipment to conduct herring biomass assessment surveys annually. Since then, ADF&G has collaborated with numerous agencies (PWSSC, University of Alaska, NMFS, and the Kodiak National Wildlife Refuge) and funding sources (CIFAR, NMFS, NPRB) to continue herring biomass surveys in the KMA. Information collected is invaluable for establishing annual guideline harvest levels and for management of the fishery. Support of this project would fund two department vessel surveys (January and April) to assess herring biomass in the Kodiak Management Area.

Duration: Ongoing.

Estimated Annual Cost: $57.0

22. **Chignik Lagoon Test Fishery**

Location: Chignik Lagoon, Chignik Management Area.

Primary Objective: To provide reliable abundance estimates of sockeye salmon run strength prior to the initial commercial opening, or subsequent openings after lengthy closures, as described in the Chignik Management Area salmon management plan.

Description: Test fisheries have been utilized to assess sockeye salmon run strength in Chignik Lagoon since 1974. In addition to providing timely estimates of sockeye salmon abundance, test fisheries have also provided an opportunity to obtain sockeye salmon scale samples during commercial fishery closures. These samples have been used to assign the escapement to the stock of origin (Chignik Lake or Black Lake) enabling subsequent run strength estimates to be determined. Currently this project is funded through the department Test Fishery Fund and the catch is sold to local processors to help pay for the project. At times, excess funds generated by the sale of test fishery harvests (funds not required for vessel charters or other directly related test fishing costs) have been used for general operation of the weir; however, harvest of salmon in the test fishery in excess of determining biological characteristics of the return is not ideal. At other times, funds generated by the catch do not cover the cost of the project, leading to significant uncertainty in project budgeting. In order for this project to continue to meet its intended objectives, General Funds are required allowing for harvested salmon to be released and

subsequently harvested in the commercial and subsistence fisheries, or add to the overall escapement requirements.

Duration: Ongoing.

Estimated Annual Cost: $62.0

SHELLFISH AND GROUNDFISH

OVERVIEW OF WESTWARD REGION KING AND TANNER CRAB FISHERIES

Three major species of king crab are harvested commercially in the Westward Region. Red king crab *Paralithodes camtschaticus*, golden king crab *Lithodes aequispinus*, and blue king crab *P. platypus*. Historically the volume and value of the Westward Region king crab fisheries have been large; 190-million pounds of king crab, valued at $199 million (all fishery values here are the exvessel values) were harvested in the Westward Region during the 1980 season and annual fishery values have ranged from $32 million to $146 million during the 1990s. However, low stock levels have necessitated the closure of many king crab fisheries over the past two decades. The red king crab seasons have been closed in the Kodiak, Alaska Peninsula, and Aleutian Islands areas and, with the exception of the western Aleutian Islands, those areas have been closed since 1983. The St. Matthew Island and Pribilof Island sections of the Bering Sea were closed to commercial king crab fishing in 1999. Although the Pribilof Island fishery remains closed, the St. Matthew Island blue king crab fishery reopened in 2009/10 and in 2010/11 the harvest was 1.3 million pounds, worth $5.2 million. In 2010/11 the Bristol Bay red king crab fishery harvest was 14.8 million pounds valued at $92.5 million and the Aleutian Islands golden king crab harvest was 6.0 million pounds valued at $18.6 million.

Two primary species of the Tanner crab group (genus *Chionoecetes*) have been commercially fished in the Westward Region: snow crab *C. opilio*, and Tanner crab *C. bairdi*. The Bering Sea snow crab fishery is among the largest and most valuable crab fisheries in the world, with annual harvest during the 1990s ranging from 66 million to 329 million pounds and annual value over that period ranging from $87 million to $192 million. A severe decline in the Bering Sea snow crab stock, however, has resulted in reduced landings since 2000, with 54.3 million pounds valued at $115.2 million harvested in 2010/11. The Bering Sea Tanner crab fishery harvest in 2009/10 was 1.3 million pounds, but was closed for the 2010/11 season. Tanner crab fisheries in the Kodiak, South Peninsula, Chignik, and Bering Sea Areas have also supported high-volume and high-value fisheries historically, with over 80 million pounds harvested in 1979. Tanner crab fisheries of the GOA have been closed or prosecuted at reduced levels since the 1990s.

The king and Tanner crab fisheries of the Bering Sea-Aleutian Islands (BSAI) are managed under a federal fishery management plan (FMP) which establishes a cooperative management regime that defers crab management to the state with federal oversight. Accordingly, state regulations and management practices for BSAI king and Tanner must be consistent with the National Standards of the Magnuson-Stevens Fishery Conservation and Management Act, including those pertaining to overfishing and allowable biological catch (ABC) limits. State regulations and management practices for the BSAI king and Tanner crab fisheries must also respond to federal actions establishing community development quota (CDQ) fisheries. The

BSAI king and Tanner crab fishery rationalization program, which establishes individual fishery quotas (IFQs) for qualifying vessels, was implemented in 2005/06.

Annual guideline harvest levels (GHLs) for non-rationalized fisheries, or total allowable catch (TAC) levels for the rationalized BSAI king and Tanner crab fisheries, are established pre-season according to state harvest strategies; harvest levels in BSAI king and Tanner crab fisheries are also subject to the restriction that total fishery mortality not exceed federal ABC limits. Survey data and fishery observer data provide the information needed to establish harvest levels. Data collected by at-sea observers have become vital to the establishment of harvest levels and, in certain BSAI king crab fisheries, are the major or only source of information on stock condition.

The remoteness of the stocks supporting these high-valued fisheries poses unique challenges and imposes high costs for their management and research and the cooperative State-Federal management process of the BSAI fisheries adds an increased burden to management responsibilities. Many of the principal stock parameters related to productivity that are needed to inform development of fishery management practices remain unknown. King and Tanner crab stocks exhibit large-scale fluctuations in recruitment and abundance, but the relative importance of spawning stock size, environmental variables, habitat, and fishing effects on such fluctuations remains unresolved.

OVERVIEW OF WESTWARD REGION DUNGENESS CRAB FISHERIES

Dungeness crab fisheries in the Kodiak, Chignik and Alaska Peninsula districts are managed from the Kodiak office. There are no guideline harvest levels (GHLs); fisheries are managed by regulating size, sex, and season (3-S management). Under 3-S management, only male crab 6.5 inches in width or larger may be retained during the 7.5-month fishing season. There are no pot limits or vessel size limits. The Dungeness crab harvest for 2010 in the Westward Region was 2.15 million pounds worth $3.8 million to the fleet. Because of a lack of fishery and biological data, ADF&G has not developed a management plan or associated guideline harvest level for Dungeness crab.

SHELLFISH AND GROUNDFISH PROJECT LIST AND DESCRIPTION

Table 3.–Proposed FY13 Westward Region shellfish and groundfish fisheries projects and estimated cost (thousands of dollars), listed in descending order of priority.

Priority	Project	Year of first appearance in blue book	Estimated first-year cost ($)	Estimated annual cost ($)	Duration
1	Bering Sea-Aleutian Islands Crab Research and Observer Personnel	2003	1,185	1,185	Ongoing
2	Kodiak, Chignik, South Alaska Peninsula Shellfish/Groundfish Mgmt.	2012	103	103	Ongoing
3	Golden King Crab Pot Mortality	2008	100	100	3 years
4	Kodiak Area Dungeness Research	2003	40	40	3 years

1. **Bering Sea-Aleutian Islands Crab Research and Observer Personnel**

Location: Dutch Harbor and Kodiak.

Primary Objectives: 1) To provide funding for staff to coordinate deployment of at-sea fishery observers, direct the data collection by observers, and for research, data collection, data distribution, and analyses needed for management of the Westward Region's Bering Sea and Aleutian Islands (BSAI) commercial king and Tanner crab stocks.

Description: The BSAI king and Tanner crab stocks managed by the Westward Region support high-value commercial fisheries, worth nearly $140-million in the 2009/10 season. The nine major BSAI in the Westward Region are managed under a state-federal co-management regime specified in the federal Fishery Management Plan for Bering Sea–Aleutian Islands king and Tanner crab (FMP). Westward Region staff in Dutch Harbor and Kodiak must perform the following activities to provide the information needed for management of the state and state-federal Westward Region BSAI king and Tanner crab fisheries in accordance with Alaska Board of Fisheries (BOF) policies and regulations and the FMP:

- Coordinating deployment of at-sea observers to fishing vessels, directing the collection of data by observers during commercial fisheries, and reporting on the observer program to the public, a BOF-sanctioned advisory body, and state and federal regulatory bodies.
- Maintaining a database on data collected by observers and dockside samplers during commercial fisheries and providing observer collected-data to fishery managers, stock assessment analysts, and state and federal regulatory bodies.
- Performing stock assessment surveys on BSAI king crab stocks, other at-sea and laboratory studies on BSAI king and Tanner crab, and analyses of data and reporting results to fishery managers, stock assessment analysts, and state and federal regulatory bodies.
- Conducting cost-recovery crab fisheries in the BSAI under Test Fish Authority to provide funding for deployment of observers and for performing BSAI king crab surveys.

A staff of ten in the Dutch Harbor Office (one full-time Fishery Biologist III, two full-time Fishery Biologist IIs, four seasonal Fishery Biologist Is, two seasonal Office Assistant Is, and one seasonal Fish and Wildlife III) are needed for implementing BSAI crab fishery observer coverage, maintaining and distributing the observer and dockside sampler data, and providing logistical support for at-sea BSAI king and Tanner crab research and survey projects based in Dutch Harbor. A staff of four in the Kodiak Office (one full-time Fishery Biologist III, two full-time Fishery Biologist IIs, and one seasonal Fish and Wildlife III) are needed for designing and implementing the BSAI king and Tanner crab surveys, at-sea research projects, and laboratory studies and for analyzing and reporting on the results of those projects.

Of greatest importance to the maintenance of the Westward Region's programs for gathering, distributing, analyzing and reporting on fishery and fishery-independent data on the region's BSAI king and Tanner crab stocks is a reliable source of funding for the necessary personnel. This project provides for funding the regular-time salary and benefits for this staff of ten in Dutch Harbor and four in Kodiak. In the past, the personnel costs to support these BSAI king and Tanner crab fishery programs were supported largely by general funds, with supplementary funding from test fishery receipts, federal grants, and commercial license fees. However, while demands for increasing the scope of data collection, analysis, and reporting have increased over the years, budget cuts have resulted in reductions in the general funds allocated toward these

programs. By FY05 general fund allocations had eroded to the extent that funding for the personnel costs of these programs relies entirely on two unstable and unreliable funding sources: federal grants and test fishery receipts. The reduction in general funds dedicated to these programs caused negative effects on the Region's ability to perform the necessary activities of these programs including: 1) reduced funding for non-personnel program costs (e.g., observer contracts and vessel charters for stock surveys); 2) increased staff time expended to procure alternative funding to support the programs' activities at the expense of time concentrated on program activities; and the 3) preclusion of long-term program planning, which has significantly impacted the ability to perform long-term projects.

Duration: Long-term.

Estimated Annual Cost: $1,185

2. **Kodiak, Chignik, and South Alaska Peninsula Shellfish/Groundfish Management**

Location: Kodiak, Chignik, and South Alaska Peninsula Management Areas.

Primary Objective: Shellfish and groundfish fisheries in the Kodiak, Chignik, and South Alaska Peninsula areas' are managed by one area biologist and one assistant area biologist from the Kodiak office. Managing multiple overlapping winter fishing seasons places great demands on fishery managers.

Active winter fisheries in each management area include Tanner crab, and state-waters Pacific cod; the cod fishery has separate pot and jig allocations. Beginning in 2012, state-waters Pacific cod seasons must be coordinated with federal sectors, and managers will be required to track the federal jig and pot sectors to coordinate state-waters season openings.

Simultaneous to inseason fishery management duties, shellfish/groundfish managers prepare for two annual Alaska Board of Fisheries meetings. During Board of Fisheries meetings one of the two managers is unable to participate in inseason fishery management duties leaving one manager to oversee three management areas.

This project would fund a Fisheries Biologist I to assist with inseason management activities; assist with tracking inseason fishing effort and harvest, management reports, and Board of Fishery preparation. This project would also fund two Fish and Wildlife Technician IIIs for three months each in King Cove and Sand Point to sample commercial fishery harvests to characterize the harvest during the Pacific cod season.

Duration: Ongoing.

Estimated Annual Cost: $103k (Approximately $58k for a 9 mm Fishery Biologist I for assistance with inseason management, $40.0k for two Fish and Wildlife Technician IIIs for 6 mm total, and $5.0k for samplers travel to Sand Point and King Cove and equipment.)

3. **Golden King Crab Mortality**

Location: Kodiak.

Primary Objective: To determine holding mortality for golden king crab.

Description: Rationalization of the Aleutian Islands golden king crab fishery has resulted in fewer vessels in the fishery compared to pre-rationalization vessel participation. The remaining vessels are fishing considerably more pots and pot soak time has substantially increased. Vessels fish up to 1,800 pots and soak times regularly exceed one month, with an average soak time of up to 23 days in the western Aleutian Islands. To accommodate the prolonged soak times by increasing the time to failure of the biodegradable escape mechanisms required in pots, the Alaska Board of Fisheries recently relaxed the stipulations for the biodegradable escape mechanism required for the pots used in this fishery. ADF&G is concerned that the changes in fishing practices as a result of crab rationalization and the recent changes in escape mechanism requirements for this fishery may result in greater holding mortality of golden king crab in pots. Prior research on Tanner crab mortality in pots indicates that Tanner crab begin to experience mortality when held in pots for more than 14 days, and a significant increase in mortality after holding for 28 days. Recently-reported observations on red king crab mortality occurring in lost subsistence pots in the Kodiak area suggest that species of king crab also suffer increased mortality when held for long periods in crab pots. This project would fund research to determine the impact to golden king crab as a result of extended soak time.

Duration: Three years.

Estimated Annual Cost: $100.0

4. **Kodiak Area Dungeness Research**

Location: Kodiak Area.

Primary Objective: The Dungeness crab stock in the Kodiak District is not surveyed therefore there is no information available on the non-retained portion of the catch, or an estimate of total biomass. ADF&G has collected biological data on the retained portion of the catch during dockside sampling. In addition to the information collected at dockside on retained catch, ADF&G needs information collected at-sea on the non-retained portion of the stock to understand stock structure and to help determine if the 7.5-month fishing season is appropriate, and to allow ADF&G to quantify the reproductive health of female Dungeness crab.

Description: Data on relative abundance of sublegal-sized males, and the reproductive condition of mature females in the Kodiak Area Dungeness crab stock are needed to assure that the conservation goals of the commercial fishery are being met. Department personnel would be deployed periodically onboard commercial Dungeness crab vessels in the Kodiak Area to collect data on sublegal males and females. The second component of this project would also allow staff to electronically enter and analyze previously collected dockside data.

Duration: Three years.

Estimated Annual Cost: $40.0 (Approximately 25k for a Fishery Biologist I for 2 mm with sea duty for onboard data collection. Approximately 12k for a Fishery Biologist I for 2.0 mm for historical data collection and analysis and 3k for miscellaneous supplies.)